LETTERS TO THE EDITOR.

Recent volcanic activity in the United States: eruptions of Mount Baker.

In a late communication to *Science* from Capt. Dutton of the U. S. geological survey, he mentions the date 1850 as that of the latest volcanic eruption within the limits of the United States. This must necessarily exclude Alaska. He also refers to vague reports of volcanic activity at later dates.

In adding a mite to the subject of his paper, I would ask your permission to recall three instances of volcanic activity on this coast, leaving open the question, What is the exact line between the smouldering of the 'living' volcanoes, and those which are 'active,' or in 'eruption'? etc.

1°. In 1854 I was one day observing at the trigonometrical station on Obstruction Island in the Rosario Strait, Washington Sound: I had finished the measures for horizontal direction of the summit of Mount Baker, and was commencing a series of measures of the vertical angles for elevation, when I found the whole summit of the mountain suddenly obscured by vast rolling masses of dense smoke, which in a few minutes reached an estimated height of two thousand feet above the mountain, and soon enveloped the higher parts. Baker was distant thirty-nine geographical miles from my station, and bore about north seventy-five degrees east, true. The weather was fine, and we hoped to see a brilliant display at night; but unfortunately the sky clouded, and we could not see the light at night, nor the mountain next day: when the weather cleared, the eruption had ceased; and, instead of the white mountain mass, we discovered that the snow covering it was apparently melted away for two or three thousand feet below the two heads. Of course the snow may not have been melted, but only covered with ashes and scoriae; and we had not the means of deciding the question at that distance.

We had been in those waters during parts of 1852 and 1853, and then the snow-clad mountain was quiet.

We discovered that the crater was not on the summit, or on the secondary peak to the south-eastward, but on the flank of the higher peak, and opening towards the south or south-west. In subsequent years we occasionally saw small volumes of smoke issuing from this crater. The facts of this eruption were reported by me at the time.

2°. In 1858 Mr. John S. Hittell of San Francisco was in Victoria, and he informs me that the night clouds over Mount Baker were brilliantly illuminated by the light from an eruption of Mount Baker. Upon his making inquiries among the citizens of Victoria, they expressed themselves as being well aware of the eruption then going on.

3°. I left these waters at the close of the season of 1857; but my colleague, Capt. James S. Lawson, who succeeded me in that section, says there was no eruption for the years he observed in the Gulf of Georgia. In 1867 and in 1869 I passed through the waters of Washington Sound and the Gulf of Georgia, and returned, all in sight of Mount Baker; but there was nothing unusual in the appearance of the mountain. In 1870, when I was passing through Admiralty Inlet and the Strait of Fuca, towards Victoria, Mount Baker was very clearly in sight at about sixty miles distance, when I beheld great volumes of smoke projected from the crater to an estimated height of eight hundred feet above the higher peak. During my stay at Victoria in September, with Mount Baker distant seventy-three and three-quarter geographical miles, and bearing north seventy degrees east, true, from Rocky Hill, I made observations for the height of the two peaks, the position and size of the crater, and the height of the snow-line. I made also an accurate drawing of the outline of the mountain and its surroundings, the more particularly because rumors had found their way into the newspapers, asserting that the summit of Mount Baker had fallen in. On the contrary, I was perfectly satisfied, from my years of familiarity with its features, that no such catastrophe had taken place between 1852 and 1870; nor was I able to detect any changes in 1877, when I was daily in sight of Mount Baker for some time.

I should call attention to the fact, that, a good many years since, Mr. E. T. Coleman of Victoria (if I remember his name properly), after two unsuccessful attempts in two different seasons, was the first alpine climber who made the ascent of Mount Baker. He published his account thereof, with illustrations of the glaciers, névé, etc., in *Harper's magazine;* but I cannot recall the date. I add the following data, which were incidentally obtained in different years by Capt. Lawson and myself when engaged in regular coast-survey duty:—

The geographical position of the higher and main peak of Mount Baker is, latitude, 48° 46′ 34″ north; longitude, 121° 50′ 4″ west. The height is 10,755 feet above the sea level; the height of the second peak, which lies probably two miles towards the south-east, is 10,163 feet; the upper part of the crater is 596 feet below the summit of the mountain; and the length of the crater about 400 feet. The crater appears to be four times as long as it is broad; the narrowest part is the upper limit; and it lies on the southern slope of the main peak, and parallel with the slope, which I judged to be thirty degrees with the horizon. The lowest limit of the snow-line in September, 1870, at the close of the summer dry season, was 5,301 feet above the sea.

These observations were made with a small instrument at a long distance; but my height of the principal peak differed only seventy-two feet from the mean of previous observations, and I believe they are trustworthy.

George Davidson.

Davidson observatory, San Francisco, Cal., Sept. 1.

Linguistic studies at the Siletz agency.

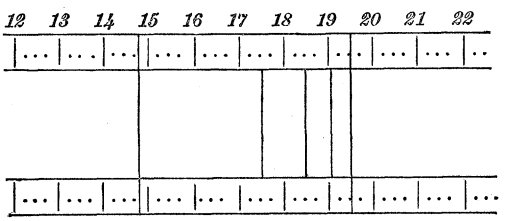
In the abstract of my first paper read in Section H., A.A.A.S., as published on p. 230 of *Science* for Sept. 11, a slight mistake was made. For 'three sets of cardinal numbers, human, inhuman, and inanimate,' read 'two sets of cardinal numbers, the human, and the non-human series.'

J. Owen Dorsey.

Washington, D.C., Sept. 19.

Spectrum of the great nebula in Andromeda.

By employing the eye fresh from some hours' sleep, by looking for some time in the spectroscope, and by



giving the spectrum a slight apparent to-and-fro motion, I have been enabled, independently, upon Sept. 5, 7, 9, 12, 21, to discern three bright lines superposed upon the continuous spectrum of the nebula in An-

dromeda. The relative positions are shown in the adjoining cut.

The 'lines' at 18.6 and 19 appear, using the broad slit, as bright knots. That at 17.5 as a long line. The arrangement of the lines suggests certain bright lines in the spectrum of γ Casseopeiae and β Lyrae, and the settings agree with those made upon the spectrum of the said stars.

O. T. S.

Yale college observatory,
Sept 14.

The Mexican axolotl and its susceptibility to transformations.

Marie von Chauvin's experiments with the axolotl, as recounted in *Science* No. 130, under the above title, interested me very much indeed, inasmuch as they came upon me at a time when I was experimenting with upwards of two hundred of these animals by very similar methods.

My present field of research is in north-western New Mexico, and several forms of axolotls are to be found in the region. Last June (1885) I visited, near my present residence, on more occasions than one, a small pond that contained large numbers of them. This pond is nearly square, and its sides something over a hundred feet in length. It is divided in two nearly equal parts by an east and west embankment. This embankment has a narrow trench cut through it, so that when the rain fills the ponds they communicate with each other; but this is not the case when the water is low.

By the 1st of September each year these ponds are usually dried up; while during the spring and summer months, the south one has a mid-depth ranging between three and six feet, and the north one being considerably shallower. These depths vary with the amount of rainfall, and other meteorological conditions.

As I say, there were great numbers of axolotls in these ponds; and as far as I could see, and by the very kind assistance of Professor Cope, these were of two kinds: one very large one (20 cms $\pm$) seemed to be the larval form of Ablystoma mavortium; another much smaller one (9 cms $\pm$) proves to be A. tigrinum. In addition to these, there are some medium-sized ones that are very puzzling, and not yet satisfactorily diagnosed. With but few exceptions, the north division of the pond contained the small ones; while in the other side lived all the large ones, together with the great majority of the light-colored and undetermined forms.

The limits of this paper will not permit me to present all the conditions of environment under which these axolotls live, much less an account of the many observations I made upon their habits as they are to be seen in a state of nature. At different times I captured as many of these creatures as I desired, to carry on my experiments at home, the results of which I had the unusual opportunity of comparing with those changes undergone by these reptiles while existing in their natural element.

It is my sole aim in this paper to briefly present the results of some of these experiments, so far as they have gone, and compare them with those arrived at by Miss von Chauvin, as set forth in *Science*.

My observations confirm those of this talented authoress, in that, —

1. Axolotls are more readily converted into Amblystomas if kept in water containing but little air, and *vice versa*.

2. If transformation is forced up to a certain point in development, the reptile arrives at the higher form without any further interference.

3. Axolotls live in the water with apparent comfort a considerable and varying length of time after their gills have been absorbed.

4. After the metamorphosis is completed, their power to return to the water again to live, seems to depend upon the moult, and whether they have lived in moist or dry places since the metamorphosis.

5. By varying the conditions under which these animals live, we can at our pleasure retard or accelerate their development to the higher stages.

6. Young axolotls are more easily transformed than the older specimens, but this rule also depends largely upon the conditions under which these animals live.

There is another very important factor that enters into this metamorphosis, that, so far as the account in *Science* goes, is not touched upon; and that is, the question of their diet during the experiments. Axolotls are very voracious creatures, and eminently carnivorous. They are very fond of raw meat; and, upon the slightest provocation, they will feed upon each other. So I have found, during the course of my experiments, that, —

7. The metamorphosis is hastened by regularly supplying the animals with plenty of proper food. And what is still more interesting, when they are thus treated, it markedly affects the appearance of the transformed Amblystoma.

8. If, during the process of forcing the transformation of axolotls, the animals are regularly supplied with the requisite amount of fresh meat, the transformed Amblystomas are very much larger and stronger than those which are transformed without having received any food. In the case of A. tigrinum, those that received food, the transformed animal would hardly have been recognized as the same species: they were not only larger, but of a very deep, muddy, *black* color, without spots; while the others were mottled with bright yellow, and a pale brown.

9. The *depth* of the water has a wonderful influence upon the metamorphosis; and the fact is well known, that, the deeper the water in which the axolotls live, the slower their transformation.

Temperature is another important factor in the change, and its moderate increase seems to hasten the transformation.

Now, the most interesting part of all is to watch the operation of these laws, that I have given, in nature, and the manner in which the metamorphosis of axolotls is there effected.

It would, indeed, be hard to find anywhere a more perfect and beautiful example illustrating the extremely sensitive balance that may exist between the surrounding conditions on the one hand, and their effect upon an animal organism on the other. This year, for instance, the very pond that I have alluded to above, gradually dried up; the north half of it entirely. This took a number of weeks; but during that time *all* the modifications of which the metamorphoses of axolotls are subject to, or capable of, were, so far as their necessity goes, most lucidly demonstrated. A shallow corner in this pond would, after a torrid day or two, dry up; whereupon all the axolotls that happened to be caught within its limits, would be found, perhaps several hundred of them, under the *débris*, rapidly assuming the Amblystoma form. Numbers of the same generation, however, in the deeper parts, would be unaffected by the change of environment so suddenly precipitated upon their brethren. If the drying-up continued, these trans-